

Electro-Hypersensitivity Does Not Exist

Document 6 — Fauna and Flora: What Nonhuman Life Teaches Us About Radiofrequency Radiation

Comment submitted in response to the U.S. Department of Health and Human Services (HHS) *Request for Information on Electromagnetic Fields (EMFs), Radiofrequency (RF) Radiation, and Wireless Radiation Exposure*, FR Doc. 2026-19252, Docket HHS-OASH-2026-0397.

Question addressed: 14.

Authors: Independent researchers, Europe (Belgium, France, Luxembourg). October 2026.

The subjects addressed in this document are part of an open publication, intended to receive further testimonies and contributions.

Abstract

This document brings together the scientific evidence on the effects of radiofrequency radiation on fauna and flora. No exposure limit has been established for nonhuman life: the limits in force were designed for human beings and are verified at the places human beings frequent, whereas birds nest on antenna supports and insects fly in contact with transmitters. The available studies are of two kinds. Controlled experiments show that the orientation of migratory birds and bats is disrupted by very weak radio noise, far below the limits, and that plants respond to radiofrequency radiation through identified cellular mechanisms. In the laboratory, *Ixodes ricinus* ticks, the main vector of Lyme disease in Europe, move toward an area exposed to 900 MHz, and do so even more when they are infected with *Rickettsia*. Field observations associate proximity to mobile phone antennas with reduced reproduction in the white stork, lower sparrow density, high tadpole mortality, and damage to trees on the exposed side. These observations are disputed on methodological grounds, and, to our knowledge, none has been taken up in a public research program. European institutions conclude that there is no solid evidence of harmful effects under realistic conditions, while themselves noting that high-quality field studies are rare. In the United States, the Department of the Interior judged as early as 2014 that federal standards were inappropriate for wildlife, and in 2021 a federal court faulted the Federal Communications Commission (FCC) for failing to respond to comments on environmental harm. Living beings can neither move away from the sources nor be suspected of a nocebo effect: their protection requires reduction at the source and the preservation of areas free of artificial radiation.

This document sets out seven recommendations.

1. Purpose

Question 14 of the Request asks what scientific evidence exists on the potential adverse effects of radiofrequency radiation on the environment. We answer it for wildlife, for trees and plants, and for the sky. Livestock is addressed in Document 5 (Section 4.2); changes in ambient levels, synthesized by [Levitt et al. \(2022a\)](#), in Document 1 (Section 3.1).

2. Methods and Sources

The sources are of four kinds: peer-reviewed publications; literature reviews from all sides of the debate; documents from European and U.S. public bodies, consulted in their original text; and press releases from universities and institutes, whose position is stated. The articles by Levitt, Lai, and Manville and their coauthors (2022–2025), Alfonso Balmori’s work on storks, sparrows, and tadpoles, the study of trees in Bamberg and Hallstadt, and the reviews by [Verschaeve and Bervoets \(2012\)](#), by the European EKLIPSE project (2018), and by [Cucurachi et al. \(2013\)](#) were consulted when our files were compiled. The report of the German Federal Office for Radiation Protection ([Pophof et al., 2023](#)) was also analyzed; its conclusions are reported without verbatim quotation. The bat study by [Lindecke et al. \(2026\)](#), the insect study by [Thielens et al. \(2018\)](#), and the study by [Everaert and Bauwens \(2007\)](#) are cited from their abstracts, and the first also from the University of Oldenburg press release; the robin study by [Engels et al. \(2014\)](#), from the press release of the same university. On ticks, the articles by [Vargová et al. \(2022\)](#) and [Bañas et al. \(2023\)](#) were read in full, and those by [Vargová et al. \(2018\)](#) and [Frątczak et al. \(2020\)](#) from their abstracts; the *Dernières Nouvelles d’Alsace* report is cited from a viewing by one of us, the video not having been transcribed. Quotations in English are reproduced as written. Quotations from French and German sources are our translations; the original wording appears in the French version of this document.

3. An Exposure the Standards Overlook

No exposure limit has been set for animals and plants. The ICNIRP limits, adopted in Europe, and the FCC limits in the United States were established for the human body, on the basis of tissue heating, and compliance with them is verified at locations accessible to the public. Levitt, Lai, and Manville distinguish emissions, which characterize the field at the source, from exposures, which are absorbed by an organism ([Levitt et al., 2022d](#)). Compliance checks are carried out at ground level or in places accessible to the public, not at antenna height, where birds nest and insects fly; in the near field, an installation can be deemed compliant even though levels there exceed federal limits by several thousand times ([Levitt et al., 2025](#)). The report of the German Federal Office for Radiation Protection itself notes that flying species—insects, birds, and bats—can come closer to transmitters than human beings, and that biological effects should be studied more closely in the field ([Pophof et al., 2023](#)). A simulation on insect models further shows that absorbed power increases with frequency: a shift of 10% of the incident power density to frequencies above 6 GHz would lead to “an increase in absorbed power between 3–370%” ([Thielens et al., 2018](#)), which directly concerns the high 5G bands and those envisaged for 6G (Document 5).

For wildlife, Levitt and coauthors propose a specific absorption rate (SAR) of 0.003 W/kg and a power density of 0.005 mW/cm² (Levitt et al., 2025); this power density is two hundred times lower than the ICNIRP reference level for the public above 2 GHz, which is 10 W/m².

4. What the Studies Show

4.1 Orientation in Migratory Species

The most rigorous experiment concerns the European robin. In wooden huts on the University of Oldenburg campus, migrating robins lost their magnetic orientation; when the huts were shielded with aluminum sheets, which attenuate time-varying fields without altering the Earth's magnetic field, they regained it, and lost it again, under double-blind conditions, as soon as the grounding of the shield was disconnected or broadband noise was added (Engels et al., 2014). The noise in question lay between 2 kHz and 5 MHz, at intensities on the order of one-thousandth of the World Health Organization (WHO) limit; according to the university, "This interference does not stem from power lines or mobile phone networks": it was mainly produced by electronic devices (University of Oldenburg, 2014). The result therefore does not concern mobile phone frequencies; it establishes that an essential biological function is disrupted by artificial radiation far below the limits, through a nonthermal mechanism.

A comparable result was published in May 2026 for bats. On the Baltic coast of Latvia, migratory soprano pipistrelles were exposed to radiofrequency fields from 0.01 to 300 MHz, then tested later in the night: "Whereas control bats oriented normally, bats exposed to RF noise exhibited random departure flight orientation, suggesting disruptive effects lasting beyond immediate exposure" (Lindecke et al., 2026). The noise was weak; for the lead author, the applicable limits protect human beings without taking wildlife into account, and "Our results show that wild animals can be affected well below these thresholds" (University of Oldenburg, 2026). The authors conclude that electromagnetic pollution could have a greater effect on animal behavior than previously assumed.

Magnetoreception is one of the oldest known biological functions; it is found in bacteria, insects, fish, reptiles, birds, and mammals (Levitt et al., 2022b). In migratory birds, according to the most studied hypothesis, it relies on retinal proteins, the cryptochromes, whose response to the magnetic field involves radical pairs that are sensitive to very weak fields.

4.2 Birds Near Mobile Phone Antennas

In Valladolid (Spain), Alfonso Balmori monitored sixty white stork nests in 2003: the thirty nests located within 200 meters (about 650 feet) of an antenna produced 0.86 fledglings per nest, compared with 1.6 for the thirty nests located more than 300 meters (about 1,000 feet) away ($P = 0.001$), and twelve of the former (40%) produced none, compared with a single one of the latter (3.3%); the mean field measured near the nests was 2.36 V/m, compared with 0.53 V/m (Balmori, 2005). The author specifies that the measurements were taken near the nests, which were inaccessible, and that field conditions do not allow all variables to be controlled.

The same author counted house sparrows at thirty points in the city, about once a month from October 2002 to May 2006. Density decreases as the field increases ($R = -0.87$; $P = 0.0001$); in a square where a picocell was installed from January to March 2005, the number of sparrows dropped during those three months, and they became abundant again after it was removed (Balmori and Hallberg, 2007). In Flanders, at 150 points in six neighborhoods, the number of breeding male house sparrows was likewise inversely related to the electric field in the 900 and 1,800 MHz bands (Everaert and Bauwens, 2007).

These studies have been criticized. In a report prepared for Brussels Environment, Verschaeve and Bervoets consider that the measurements, made with a directional antenna or not at the nest, do not correctly reflect exposure, and that confounding factors cannot be ruled out (Verschaeve and Bervoets, 2012). The German Federal Office for Radiation Protection points out that a correlation does not establish a causal link (Pophof et al., 2023). In India, a field study found no effect of radiation on habitat use by sparrows (Nath et al., 2022), a conclusion disputed by Balmori and Balmori-de la Puente in light of the study's own data (Balmori and Balmori-de la Puente, 2024). To our knowledge, no study has repeated the stork protocol while measuring exposure at the nest.

The U.S. Department of the Interior wrote in 2014: “There is a growing level of anecdotal evidence linking effects of non-thermal, non-ionizing electromagnetic radiation from communication towers on nesting and roosting wild birds and other wildlife in the U.S.” (U.S. Department of the Interior, 2014). The same letter stated: “To date, no independent, third-party field studies have been conducted in North America on impacts of tower electromagnetic radiation on migratory birds” (U.S. Department of the Interior, 2014); the FCC restates its substance in its 2026 consultation (FCC, 2026).

4.3 Amphibians

In an experiment conducted 140 meters (about 460 feet) from four base stations, seventy common frog tadpoles placed in an exposed tank (1.8 to 3.5 V/m) showed a mortality of 90%, asynchronous growth, and poorly coordinated movements, compared with a mortality of 4.2% for the seventy tadpoles in an identical tank placed inside a Faraday cage (Balmori, 2010). The experiment includes only one tank per condition and no statistical test, and the field was not measured inside the cage; Verschaeve and Bervoets consider it “subject to severe criticism” for the lack of valid dosimetry (Verschaeve and Bervoets, 2012). To our knowledge, it has never been repeated. As early as 2006, Balmori noted that the ubiquity of radiofrequency radiation makes it difficult to establish an unexposed control group (Balmori, 2006).

4.4 Insects

The simulation already cited (Thielens et al., 2018) shows that the exposure of insects would increase with the shift to higher frequencies. Beyond that, the data are debated: the reviews that attribute to radiofrequency radiation a role in insect decline are disputed by the German Federal Office for Radiation Protection, which concludes that mobile telephony cannot be considered a major cause of it; the European EKLIPSE project identifies, among the frequent weaknesses of the studies, the absence of blinding, of appropriate controls, and of exposure characterization, and

considers most reviews to be one-sided (Malkemper et al., 2018). The two positions agree on one point: well-designed field studies are lacking.

4.5 Ticks

A Slovak and Polish team has been observing how ticks react to radiofrequency radiation since 2017. Its experiments take place in an anechoic chamber, shielded from outside fields, in setups that give the ticks a choice between an exposed area and a shielded area. Exposed to 900 MHz, the GSM mobile telephony frequency, *Dermacentor reticulatus* ticks gathered in the exposed area; at 5,000 MHz, they fled to the shielded area (Vargová et al., 2018). Among 300 adult *Ixodes ricinus* ticks, the main vector of Lyme disease in Europe, exposed to 900 MHz, the ticks were attracted to the irradiated area, and the effect was significantly stronger in those infected with *Rickettsia*, the bacteria of spotted fevers; the authors infer that pathogens can alter the ticks' response to environmental stimuli (Frątczak et al., 2020).

A replication on 1,200 ticks of four species, exposed for 24 hours to 900 MHz at 40 V/m, found the same preference in both sexes of *Ixodes ricinus*—95 females and 89 males out of 150 in the exposed area—and in the males of both *Dermacentor* species, but not in their females nor in *Haemaphysalis inermis*; no species fled the exposed area (Bañas et al., 2023). The results do not all point the same way: at 0.6 V/m, *Ixodes ricinus* females showed no preference; in an open arena, near a mobile phone during a call, they did, however, travel farther and spend more time in the exposed part, from 50.5% to 66.7% of the time depending on the period (Vargová et al., 2022). The authors attribute these discrepancies, without being able to settle the matter, to the parameters of the radiation used (Bañas et al., 2023). This work is funded by Slovak public research agencies; Levitt, Lai, and Manville report it in their review (Levitt et al., 2022b).

The stakes go beyond animal behavior. The authors ask whether man-made electromagnetic fields may influence the activity of *Ixodes ricinus* and contribute to the changes in the distribution of the tick and its pathogens observed in Europe and elsewhere (Frątczak et al., 2020); in their view, their results could help assess the risk of tick-borne diseases and serve preventive medicine (Vargová et al., 2018). The field is already raising the question. In Alsace, Nathalie Boulanger, a medical entomologist at the University of Strasbourg, cites the Murbach valley—a white zone where we measured no mobile telephony waves in August 2026—among the places where more than 20% of ticks are reportedly infected with the Lyme disease bacterium (Dernières Nouvelles d'Alsace, 2026). She does not herself link this elevated rate to the absence of waves from the mobile telephone network, and laboratory results are not enough to explain this phenomenon. These experiments were conducted in the laboratory, on European species; to our knowledge, no field study has measured the distribution of ticks around antennas, and *Ixodes scapularis*, the vector of Lyme disease in the United States, has not been tested. Document 9 (Section 5) addresses Lyme disease in the electro-hypersensitive.

4.6 Trees and Plants

In Bamberg and Hallstadt (Germany), a study conducted over nine years across two cities examined 120 trees, with 144 measurement points between 0.047 and 2.53 V/m, that is, values far below the

limits. The values measured were significantly higher on the damaged side, facing the antenna, than on the opposite side; the thirty trees selected in areas below 50 $\mu\text{W}/\text{m}^2$, with no line of sight to an antenna, showed no damage (Waldmann-Selsam et al., 2016). The German Federal Office for Radiation Protection considers that, because of the nonrandom selection of the trees, these observations alone do not allow a scientific conclusion (Pophof et al., 2023); the 2023 review conducted for the Brussels-Capital Region includes the study without any particular methodological reservation (according to our files).

In the laboratory, plants respond to radiofrequency radiation through identified mechanisms. A review reports a 30% drop in ATP, the molecule that carries the cell's energy, thirty minutes after a ten-minute exposure at 900 MHz and 5 V/m; gene responses are strongly reduced when calcium is neutralized, which makes calcium a second messenger of the signal; an exposure limited to a single leaf triggers a response in unexposed leaves (Vian et al., 2016). The German Federal Office for Radiation Protection acknowledges that plants react in the laboratory to low-intensity radiofrequency radiation, while noting the lack of sufficient field studies (Pophof et al., 2023). Of 113 studies identified by a systematic review, effects were found in 65%, that is, in about half of the animal studies and three-quarters of the plant studies, according to the count given by Levitt et al. (Cucurachi et al., 2013; Levitt et al., 2022b).

4.7 Aquatic Environments

The studies mainly concern the static and extremely low-frequency (ELF) fields of submarine cables. In a search conducted on August 19, 2026, we found no study on the exposure of freshwater organisms to radiofrequency radiation, which documents the state of research, not the absence of effect.

5. The Sky

The aerosphere, from ground level up to several kilometers (a few miles) in altitude, is the habitat of birds, bats, and flying insects; Levitt, Lai, and Manville propose recognizing it as a habitat in its own right, on a par with water or soil (Levitt et al., 2022c, 2025). It is now continuously crossed by emissions from satellite constellations. The Government Accountability Office (GAO), the audit body of the U.S. Congress, recommended in 2022 that the FCC reexamine the 1986 categorical exclusion that generally exempts satellites from environmental review, noting light pollution, interference with radio astronomy, and the possible effects of atmospheric reentries (GAO, 2022). In addition, second-generation Starlink satellites emit, outside their communication bands, unintended radio radiation up to 32 times more intense than that of the previous generation (Bassa et al., 2024; Document 5, Section 3.5). This radiation reaches every location, including radio quiet zones and protected natural areas on the ground.

6. Institutional Positions

In the United States. On February 7, 2014, the Department of the Interior wrote to the National Telecommunications and Information Administration that the FCC standards “continue to be based on thermal heating, a criterion now nearly 30 years out of date and inapplicable today” (U.S. Department of the Interior, 2014). On August 13, 2021, the U.S. Court of Appeals for the District of Columbia Circuit held that the FCC’s decision to retain its limits was arbitrary, in particular for “its complete failure to respond to comments concerning environmental harm caused by RF radiation,” and remanded the matter to the agency for an explanation (D.C. Circuit, 2021). Five years later, on September 17, 2026, the FCC opened a consultation on this remand (public notice DA 26-997, published in the Federal Register on September 22); in it, the agency asks what probative weight to give the Department of the Interior letter and cites the position of the Australian radiation protection agency, according to which good-quality studies show no effect of radio waves on plants and animals (FCC, 2026).

In Europe. The report of the German Federal Office for Radiation Protection, based on a workshop held in 2019, concludes that there is no solid evidence of harmful effects of low-intensity radiofrequency radiation on animals and plants under realistic conditions, while noting the scarcity of field studies of sufficient quality and recommending further research (Pophof et al., 2023). For the Brussels-Capital Region, the 2012 review considered it unlikely, in light of laboratory studies, that such weak fields could have the effects reported on storks (Verschaeve and Bervoets, 2012); its December 2023 update considers that the regional standard, raised to 14.57 V/m outdoors, does not significantly compromise the integrity of Natura 2000 sites, while acknowledging a risk of displacement of disturbed species and recommending that the review be renewed every six to ten years (according to our files). This standard had been set at 3 V/m by the 2007 ordinance, which was in force in 2009.

7. Discussion

Question 14 asks what evidence exists. The evidence is of two kinds. Controlled experiments on the orientation of birds and bats, those on the behavior of ticks, and laboratory work on plants establish that living organisms respond to artificial radiation far below the limits, through nonthermal mechanisms. Field observations near mobile phone antennas—storks, sparrows, tadpoles, trees—point in the same direction, but their methodology is debated. The debate bears less on the results than on the quality of exposure measurement, and it has not been settled by new studies: to our knowledge, the institutions that criticize these observations have not repeated them with a better protocol. The Department of the Interior noted in 2014 that no independent field study existed in North America; the absence of field studies is a choice of research priorities, not proof of safety.

The experiments on ticks add a health dimension. If radiofrequency radiation alters the activity or distribution of vectors, the effect on nonhuman life comes back to human beings through the diseases these vectors transmit; this is the question the authors themselves raise (Section 4.5), and, to our knowledge, no field study has yet settled it.

These data have implications beyond wildlife. Animals and trees do not know that an antenna is nearby; as Balmori writes, studies on animals and trees are of special importance because they “cannot be aware of their proximity and to which psychosomatic effects can never be attributed” (Balmori, 2022). The nocebo objection, raised against the electro-hypersensitive, cannot be raised against them. The most convincing experiments are, moreover, those that removed the exposure: the shielding of the Oldenburg huts, the Faraday cage of the tadpoles, the removal of the Valladolid picocell.

Finally, wild animals cannot move away from the sources, and trees even less so. Their protection can only come from reducing exposure at the source and from preserving spaces that are free of it. White zones, which coverage policy is eliminating (Documents 1 and 5), are the last electromagnetically intact habitats: the more of them there are, the better living beings are protected.

8. Limitations

A large share of the field observations comes from a single author and a single city; they have not been replicated. Several studies are cited from their abstracts or from a press release, as indicated in Section 2. The robin study concerns frequencies lower than those of mobile telephony, and the bat study stops at 300 MHz. Many of the studies on insects and plants are laboratory work; all of those on ticks are laboratory work, come from a single research group, and concern European species. The 2023 Brussels update and the survey of aquatic studies are reported from our files.

9. Recommendations (Question 14)

1. Establish, through bodies independent of the industry, exposure limits intended for fauna and flora, taking into account the near field of antennas, where birds nest and insects fly.
2. Subject antennas, small cells, and satellite constellations to prior environmental review, and end the categorical exclusion that exempts satellites from it.
3. Fund independent field studies based on removing the exposure—shielding, switching off an antenna, before and after—which have so far yielded the clearest results.
4. Preserve the white zones that remain and re-create others, for living beings as for the electro-hypersensitive; exclude protected natural areas from any deployment, whether terrestrial or satellite.
5. Reduce exposure at the source throughout the territory, in accordance with the ALARA principle (Council of Europe, 2011, § 8.4.3), since living beings cannot move away from transmitters.
6. In assessing effects on human health, take into account the observations made on animals and plants, to which no psychosomatic effect can be attributed.
7. Commission studies, in the field and on species present in the United States, including *Ixodes scapularis*, of the effect of radiofrequency radiation on the activity and distribution of ticks, and

take them into account in federal work on the diseases ticks transmit.

Glossary

Term	Meaning
5G, 6G	Fifth and sixth generations of mobile telephone networks. 6G has not yet been deployed.
ALARA	<i>As low as reasonably achievable</i> : the principle that an exposure should be kept as low as reasonably possible.
Anechoic chamber	A room with absorbent walls that blocks outside electromagnetic fields and suppresses reflections, used for tests under controlled radiation.
ATP	Adenosine triphosphate: the molecule that carries energy within the cell.
Base station	A mobile telephone installation comprising one or more base station antennas.
Categorical exclusion	In U.S. environmental law, a category of actions exempted from environmental review.
Council of Europe	Intergovernmental organization of 46 European states, distinct from the European Union; its Parliamentary Assembly adopted Resolution 1815.
Cryptochrome	A light-sensitive protein, found notably in the retina of birds, involved in the perception of the Earth's magnetic field.
EKLIPSE	A coordination project funded by the European Union, tasked with informing public decisions on biodiversity.
Electro-hypersensitivity	The highest degree of electrosensitivity, a sensitivity to electromagnetic fields shared, to varying degrees, by all human beings; we regard it as a syndrome, not a disease (see Document 4, Section 3.1).
Faraday cage	A conductive enclosure that blocks external electromagnetic fields.
FCC	Federal Communications Commission: U.S. federal agency that regulates telecommunications and sets the limits for exposure to radiofrequency radiation.
GAO	Government Accountability Office: the audit and evaluation body of the U.S. Congress.
German Federal Office for Radiation Protection	Bundesamt für Strahlenschutz (BfS): German public agency responsible for protection against radiation.
Hertz (Hz, kHz, MHz, GHz)	Unit of frequency: one kilohertz equals one thousand hertz, one megahertz one million, one gigahertz one billion.
ICNIRP	International Commission on Non-Ionizing Radiation Protection: a private-law association registered in Germany, whose guidelines underpin European exposure limits.
Lyme disease	An infection caused by bacteria of the <i>Borrelia burgdorferi</i> group, transmitted by ticks of the genus <i>Ixodes</i> ; also called Lyme borreliosis.
Magnetoreception	The ability of an organism to perceive the Earth's magnetic field and to use it for orientation.

Term	Meaning
Natura 2000	European network of natural sites protected under the Birds and Habitats Directives.
Near field, far field	The near field is the zone very close to an antenna, where the radiation has not yet stabilized and where exposure is poorly described by the usual measurements; the far field is the zone beyond it.
Nocebo effect	The onset of symptoms attributed to the expectation of a harmful effect, and not to the agent itself.
Picocell	A very short-range mobile phone antenna, installed in cities on street furniture or on a building facade.
Radical pair	A pair of molecules each carrying an unpaired electron, whose evolution can be influenced by very weak magnetic fields.
Radio quiet zone	Area where radio emissions are restricted by law to protect radio astronomy observations, as around Green Bank (United States).
Resolution 1815	Resolution adopted on May 27, 2011, by the Parliamentary Assembly of the Council of Europe on the potential dangers of electromagnetic fields and their effect on the environment.
Rickettsia	A bacterium of the genus <i>Rickettsia</i> , transmitted notably by ticks, which causes spotted fevers.
Specific absorption rate (SAR)	Power absorbed per unit mass of tissue, in watts per kilogram (W/kg).
Tick	A parasitic arachnid that feeds on the blood of vertebrates and transmits many pathogens; <i>Ixodes ricinus</i> in Europe and <i>Ixodes scapularis</i> in the eastern United States transmit Lyme disease.
U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit)	U.S. federal court that hears, among other matters, challenges to the decisions of federal agencies, including the FCC.
U.S. Department of the Interior	U.S. federal executive department responsible, among other things, for wildlife, through its Fish and Wildlife Service.
V/m, $\mu\text{W}/\text{m}^2$, mW/cm^2	Units of field strength: the volt per meter measures the electric field; the microwatt per square meter and the milliwatt per square centimeter measure power density.
White zone	In territorial planning, an area without mobile coverage, which public policy aims to eliminate; for the electro-hypersensitive, a place almost free of artificial radiation, which must be preserved (see Document 1).

References

- Balmori, A. (2005). Possible effects of electromagnetic fields from phone masts on a population of white stork (*Ciconia ciconia*). *Electromagnetic Biology and Medicine*, 24(2), 109–119. <https://doi.org/10.1080/15368370500205472> [back to text](#)
- Balmori, A. (2006). The incidence of electromagnetic pollution on the amphibian decline: Is this an important piece of the puzzle? *Toxicological & Environmental Chemistry*, 88(2), 287–299. <https://doi.org/10.1080/02772240600687200> [back to text](#)
- Balmori, A. (2010). Mobile phone mast effects on common frog (*Rana temporaria*) tadpoles: The city turned into a laboratory. *Electromagnetic Biology and Medicine*, 29(1-2), 31–35. <https://doi.org/10.3109/15368371003685363>

[back to text](#)

- Balmori, A. (2022). Evidence for a health risk by RF on humans living around mobile phone base stations: From radiofrequency sickness to cancer. *Environmental Research*, 214, 113851. <https://doi.org/10.1016/j.envres.2022.113851>
[1 back to text](#)
- Balmori, A., & Balmori-de la Puente, A. (2024). Comments on the paper “Correlation does not imply causation: decline of House Sparrow overshadowed by electromagnetic radiation” by Nath et al. *Urban Ecosystems*, 27(4), 1111–1115. <https://doi.org/10.1007/s11252-024-01512-6> [back to text](#)
- Balmori, A., & Hallberg, Ö. (2007). The urban decline of the house sparrow (*Passer domesticus*): A possible link with electromagnetic radiation. *Electromagnetic Biology and Medicine*, 26(2), 141–151. <https://doi.org/10.1080/15368370701410558> [back to text](#)
- Bañas, M., Šofranková, L., Kurimský, J., Pavlík, M., Pikalík, M., Majláthová, V., Cimbala, R., Pipová, N., Wurfl, L., & Majláth, I. (2023). Interspecific differences in the behavioral response of ticks exposed to radiofrequency electromagnetic radiation. *Experimental and Applied Acarology*, 91(3), 477–485. <https://doi.org/10.1007/s10493-023-00847-7> [back to text : 1, 2, 3](#)
- Bassa, C. G., Di Vruno, F., Winkel, B., Józsa, G. I. G., Brentjens, M. A., & Zhang, X. (2024). Bright unintended electromagnetic radiation from second-generation Starlink satellites. *Astronomy & Astrophysics*, 689, L10. <https://doi.org/10.1051/0004-6361/202451856> [back to text](#)
- Council of Europe, Parliamentary Assembly. (2011). Resolution 1815 (2011), *The potential dangers of electromagnetic fields and their effect on the environment*, text adopted May 27, 2011. <https://pace.coe.int/en/files/17994/html>
[back to text](#)
- Cucurachi, S., Tamis, W. L. M., Vijver, M. G., Peijnenburg, W. J. G. M., Bolte, J. F. B., & de Snoo, G. R. (2013). A review of the ecological effects of radiofrequency electromagnetic fields (RF-EMF). *Environment International*, 51, 116–140. <https://doi.org/10.1016/j.envint.2012.10.009> [back to text : 1, 2](#)
- Dernières Nouvelles d'Alsace. (2026). *Reportage vidéo sur les tiques et le changement climatique en Alsace, avec Nathalie Boulanger* [Video report on ticks and climate change in Alsace, with Nathalie Boulanger; video posted on LinkedIn, viewed in August 2026; statements reported from our viewing, the video not being transcribed].
[back to text](#)
- Engels, S., Schneider, N.-L., Lefeldt, N., Hein, C. M., Zapka, M., Michalik, A., Elbers, D., Kittel, A., Hore, P. J., & Mouritsen, H. (2014). Anthropogenic electromagnetic noise disrupts magnetic compass orientation in a migratory bird. *Nature*, 509(7500), 353–356. <https://doi.org/10.1038/nature13290> [back to text : 1, 2](#)
- Everaert, J., & Bauwens, D. (2007). A possible effect of electromagnetic radiation from mobile phone base stations on the number of breeding house sparrows (*Passer domesticus*). *Electromagnetic Biology and Medicine*, 26(1), 63–72. <https://doi.org/10.1080/15368370701205693> [back to text : 1, 2](#)
- Federal Communications Commission (FCC). (2026, September 22). FCC seeks comment on RF exposure issues subject to D.C. Circuit remand in *Environmental Health Trust v. FCC* [public notice DA 26-997 of September 17, 2026, ET Docket No. 13-84]. *Federal Register*, 91 FR 60128, FR Doc. 2026-19364. <https://www.federalregister.gov/documents/2026/09/22/2026-19364/fcc-seeks-comment-on-rf-exposure-issues-subject-to-dc-circuit-remand-in-environmental-health-trust-v> [back to text : 1, 2](#)
- Frątczak, M., Vargová, B., Tryjanowski, P., Majláth, I., Jerzak, L., Kurimský, J., Cimbala, R., Jankowiak, Ł., Conka, Z., & Majláthová, V. (2020). Infected *Ixodes ricinus* ticks are attracted by electromagnetic radiation of 900 MHz. *Ticks and Tick-borne Diseases*, 11(4), 101416. <https://doi.org/10.1016/j.ttbdis.2020.101416> [back to text : 1, 2, 3](#)
- Government Accountability Office (GAO). (2022, November 2). *Satellite licensing: FCC should reexamine its environmental review process for large constellations of satellites* (GAO-23-105005). <https://www.gao.gov/products/gao-23-105005> [back to text](#)
- Levitt, B. B., Lai, H. C., & Manville, A. M., II. (2022a). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 1. Rising ambient EMF levels in the environment. *Reviews on Environmental Health*, 37(1), 81–122. <https://doi.org/10.1515/reveh-2021-0026> [back to text](#)
- Levitt, B. B., Lai, H. C., & Manville, A. M., II. (2022b). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 2. Impacts: how species interact with natural and man-made EMF. *Reviews on Environmental Health*, 37(3), 327–406. <https://doi.org/10.1515/reveh-2021-0050> [back to text : 1, 2, 3](#)
- Levitt, B. B., Lai, H. C., & Manville, A. M., II. (2022c). Effects of non-ionizing electromagnetic fields on flora and fauna, Part 3. Exposure standards, public policy, laws, and future directions. *Reviews on Environmental Health*,

37(4), 531–558. <https://doi.org/10.1515/reveh-2021-0083> back to text

- Levitt, B. B., Lai, H. C., & Manville, A. M., II. (2022d). Low-level EMF effects on wildlife and plants: What research tells us about an ecosystem approach. *Frontiers in Public Health*, 10, 1000840. <https://doi.org/10.3389/fpubh.2022.1000840> back to text
- Levitt, B. B., Lai, H. C., Manville, A. M., II, & Scarato, T. (2025). Flora and fauna: How nonhuman species interact with natural and man-made EMF at ecosystem levels and public policy recommendations. *Frontiers in Public Health*, 13, 1693873. <https://doi.org/10.3389/fpubh.2025.1693873> back to text : 1, 2
- Lindecke, O., Schneider, W. T., Vintulis, V., Jordan, N., Cellarius, F., Marggraf, L. C., Niehues, J., Jaunzemis, V., Keišs, O., & Holland, R. A. (2026). Disruptive effects of brief radiofrequency noise exposure on migratory bat navigation. *Science*, 392(6801), 977–979. <https://doi.org/10.1126/science.adq4418> back to text : 1, 2
- Malkemper, E. P., Tscheulin, T., Vanbergen, A. J., Vian, A., Balian, E., & Goudeseune, L. (2018). *The impacts of artificial electromagnetic radiation on wildlife (flora and fauna). Current knowledge overview: A background document to the web conference. A report of the EKLIPSE project.* https://eklipse.eu/wp-content/uploads/2020/10/EMR-KnowledgeOverviewReport_FINAL_27042018-1.pdf back to text
- Nath, A., Singha, H., & Lahkar, B. P. (2022). Correlation does not imply causation: Decline of house sparrow overshadowed by electromagnetic radiation. *Urban Ecosystems*, 25(4), 1279–1295. <https://doi.org/10.1007/s11252-022-01227-6> back to text
- Pophof, B., Henschenmacher, B., Kattinig, D. R., Kuhne, J., Vian, A., & Ziegelberger, G. (2023). Biological effects of radiofrequency electromagnetic fields above 100 MHz on fauna and flora: Workshop report. *Health Physics*, 124(1), 31–38. <https://doi.org/10.1097/HP.0000000000001625> back to text : 1, 2, 3, 4, 5, 6
- Thielens, A., Bell, D., Mortimore, D. B., Greco, M. K., Martens, L., & Joseph, W. (2018). Exposure of insects to radio-frequency electromagnetic fields from 2 to 120 GHz. *Scientific Reports*, 8, 3924. <https://doi.org/10.1038/s41598-018-22271-3> back to text : 1, 2, 3
- University of Oldenburg. (2014, May 7). *Electrosmog disrupts orientation in migratory birds* [press release]. <https://uol.de/en/news/article/electrosmog-disrupts-orientation-in-migratory-birds> back to text
- University of Oldenburg. (2026, May 29). *Electromagnetic noise disrupts soprano pipistrelle bats' orientation* [press release]. <https://uol.de/en/news/article/electromagnetic-pollution-disrupts-the-orientation-of-soprano-pipistrelle-bats> back to text
- U.S. Court of Appeals for the District of Columbia Circuit (D.C. Circuit). (2021, August 13). *Environmental Health Trust et al. v. Federal Communications Commission*, No. 20-1025, 9 F.4th 893. <https://media.cadc.uscourts.gov/opinions/docs/2021/08/20-1025-1910111.pdf> back to text
- U.S. Department of the Interior. (2014, February 7). Letter from W. R. Taylor, Office of Environmental Policy and Compliance, to the National Telecommunications and Information Administration. https://www.ntia.gov/files/ntia/us_doi_comments.pdf back to text : 1, 2, 3
- Vargová, B., Majláth, I., Kurimský, J., Cimbala, R., Kostelec, M., Tryjanowski, P., Jankowiak, Ł., Raši, T., & Majláthová, V. (2018). Electromagnetic radiation and behavioural response of ticks: An experimental test. *Experimental and Applied Acarology*, 75(1), 85–95. <https://doi.org/10.1007/s10493-018-0253-z> back to text : 1, 2, 3
- Vargová, B., Majláth, I., Kurimský, J., Cimbala, R., Zbojovský, J., Tryjanowski, P., & Majláthová, V. (2022). Locomotor activity of *Ixodes ricinus* females in 900 MHz electromagnetic field. *Life*, 12(6), 884. <https://doi.org/10.3390/life12060884> back to text : 1, 2
- Verschaeve, L., & Bervoets, L. (2012). *Influence des antennes de téléphonie mobile sur les sites Natura 2000 dans la Région de Bruxelles Capitale* [Influence of mobile phone antennas on Natura 2000 sites in the Brussels-Capital Region]. Brussels Environment. https://document.environnement.brussels/opac_css/elecfile/STUD_2012_mobilierTelefoonantennes_FR_v6 back to text : 1, 2, 3, 4
- Vian, A., Davies, E., Gendraud, M., & Bonnet, P. (2016). Plant responses to high frequency electromagnetic fields. *BioMed Research International*, 2016, 1830262. <https://doi.org/10.1155/2016/1830262> back to text
- Waldmann-Selsam, C., Balmori-de la Puente, A., Breunig, H., & Balmori, A. (2016). Radiofrequency radiation injures trees around mobile phone base stations. *Science of the Total Environment*, 572, 554–569. <https://doi.org/10.1016/j.scitotenv.2016.08.045> back to text

Non-binding document, drafted and transmitted with all reservations whatsoever.